This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. To estimate the one-sided limit of the function below as x approaches 2 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{2}{x} - 1}{x - 2}$$

The solution is $\{1.9000, 1.9900, 1.9990, 1.9999\}$, which is option A.

A. $\{1.9000, 1.9900, 1.9990, 1.9999\}$

This is correct!

B. $\{1.9000, 1.9900, 2.0100, 2.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{2.1000, 2.0100, 2.0010, 2.0001\}$

These values would estimate the limit of 2 on the right.

D. $\{2.0000, 2.1000, 2.0100, 2.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit.

E. $\{2.0000, 1.9000, 1.9900, 1.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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2. Based on the information below, which of the following statements is always true?

As x approaches 2, $f(x)$ approaches ∞.

The solution is $f(x)$ is undefined when x is close to or exactly 2., which is option B.

A. $f(x)$ is close to or exactly 2 when x is large enough.

B. $f(x)$ is undefined when x is close to or exactly 2.

C. x is undefined when $f(x)$ is close to or exactly ∞.

D. $f(x)$ is close to or exactly ∞ when x is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 2. It says **absolutely nothing** about what is happening exactly at $f(2)$!

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3. To estimate the one-sided limit of the function below as x approaches 2 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{2}{x}-1}{x-2}$$

The solution is $\{2.1000, 2.0100, 2.0010, 2.0001\}$, which is option D.

A. $\{1.9000, 1.9900, 1.9990, 1.9999\}$

These values would estimate the limit of 2 on the left.

B. $\{2.0000, 2.1000, 2.0100, 2.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit.

C. $\{2.0000, 1.9000, 1.9900, 1.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit.

D. $\{2.1000, 2.0100, 2.0010, 2.0001\}$

This is correct!

E. $\{1.9000, 1.9900, 2.0100, 2.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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4. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x\to 2^-} \frac{-6}{(x+2)^3}+2$$

The solution is $f(2)$, which is option B.

A. ∞

B. $f(2)$

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

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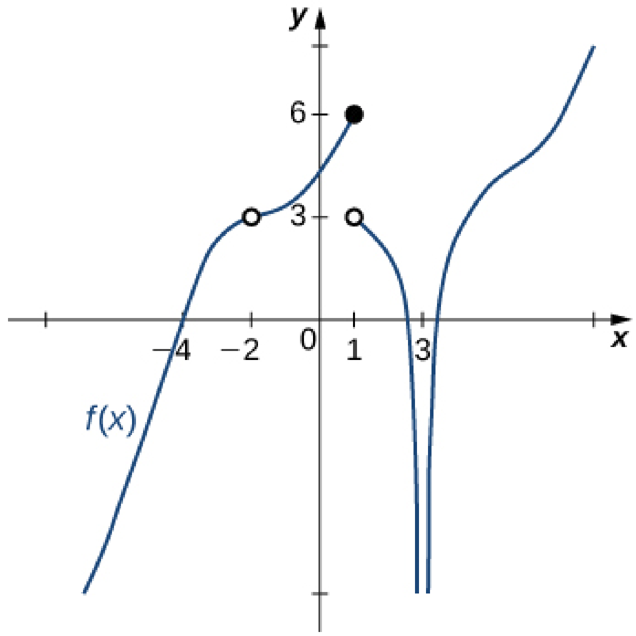
5. For the graph below, find the value(s) a that makes the statement true: $\lim_{x\to a} f(x) = 3$.



The solution is Multiple a make the statement true., which is option D.

A. -2

B. $-\infty$

C. 1

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

---

6. Based on the information below, which of the following statements is always true?

$$f(x) \textit{ approaches } \infty \textit{ as } x \textit{ approaches } 4.$$

The solution is $f(x)$ is undefined when x is close to or exactly 4., which is option C.

A. $f(x)$ is close to or exactly 4 when x is large enough.

B. x is undefined when $f(x)$ is close to or exactly ∞.

C. $f(x)$ is undefined when x is close to or exactly 4.

D. $f(x)$ is close to or exactly ∞ when x is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 4. It says **absolutely nothing** about what is happening exactly at $f(4)$!

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7. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x\to -4^-} \frac{-9}{(x+4)^7} + 6$$

The solution is ∞, which is option C.

A. $-\infty$

B. $f(-4)$

C. ∞

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

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8. Evaluate the limit below, if possible.

$$\lim_{x \to 8} \frac{\sqrt{5x-4}-6}{3x-24}$$

The solution is None of the above, which is option E.

A. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

B. 0.028

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

C. 0.745

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

D. 0.083

You likely memorized how to solve the similar homework problem and used the same formula here.

E. None of the above

* This is the correct option as the limit is 0.139.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 8$.

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9. Evaluate the limit below, if possible.

$$\lim_{x \to 7} \frac{\sqrt{5x-10}-5}{6x-42}$$

The solution is None of the above, which is option E.

A. 0.017

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

B. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

C. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

D. 0.373

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

E. None of the above

* This is the correct option as the limit is 0.083.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.

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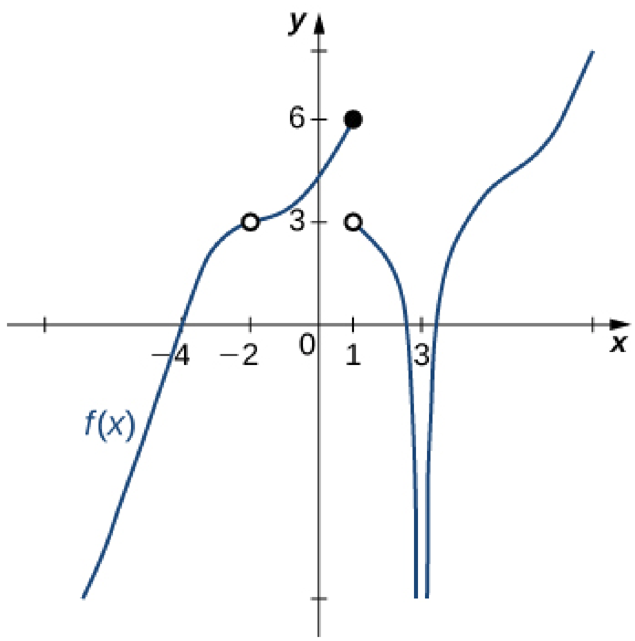
10. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = -\infty$.



The solution is Multiple a make the statement true., which is option D.

A. $-\infty$

B. 3

C. -2

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.
